

SEQUENCE LISTING

<110> RYU, WANG SHICK

<120> Hepatitis B virus vectors for gene therapy

<150> KR2000-21070

<151> 2000-04-20

<160> 5

<170> KopatentIn 1.71

<210> 1

<211> 235

<212> DNA

<213> HBV

<220>

<221> gene

<222> (1)..(235)

<223> Alpha-element of HBV

<400> 1

gtcaccatat tcttgggaac aagatctaca gcatggggca gaatctttcc accagcaatc 60

ctctgggatt ctttcccgac caccagttgg atccagcctt cagagcaaac accgcaaatc 120

cagattggga cttcaatccc aacaaggaca cctggccaga cgccaacaag gtaggagctg 180

gagcattcgg gctgggtttc accccaccgc acggaggcct tttgggttg agccc 235

<210> 2

<211> 197

<212> DNA

<213> HBV

<220>

<221> gene

<222> (1)..(197)

<223> Beta- element of HBV

<400> 2

gcatggagac caccgtgaac gcccaaaaa tattgcccaa ggtcttacat aagaggactc 60

ttggactctc agcaatgtca acgaccgacc ttgaggcata cttcaaagac tgtttgttta 120

aagactggga ggagttgggg gaggagatta ggttaaaggt ctttgacta ggaggctgta 180

ggcataaatt ggtctgc 197

<210> 3

<211> 8007

<212> DNA

<213> HBV

<220>

<221> gene

<222> (1)..(8007)
 <223> Prototype vector of HBV

<400> 3
 aactttttca cctctgccta atcatctctt gttcatgtcc tactgttcaa gcctccaagc 60
 tgtgccttgg gtggctttgg ggcattggaca tcgaccctta taaagaattt ggagctactg 120
 tggagttact ctctgttttg ccttctgact tctttccttc agtacgagat cttctagata 180
 ccgcctcagc tctgtatcgg gaagccttag agtctcctga gcattgttca cctcaccata 240
 ctgcactcag gcaagcaatt ctttgcctgg gggaactaat gactctagct acctgggtgg 300
 gtgttaattt ggaagatcca gcgtctagag acctagtagt cagttagtgc aacactaata 360
 tgggcctaaa gttcaggcaa ctcttctggt ttcacatttc ttgtctcact tttggaagag 420
 aaacagttat agagtatttg gtgtctttcg gagtgtggat tcgcactcct ccagcttata 480
 gaccacaaa tgccctatc ctatcaacac ttccggagac tactgttggt agacgacgag 540
 gcaggctccc tagaagaaga actccctcgc ctgcgagacg aaggctctca tcgccgcgtc 600
 gcagaagatc tcaatctcgg gaatctcaat gttagtattc cttggactca taagggtggg 660
 aactttactg ggctttattc ttctactgta cctgtcttta atcctcattg gaaaacacca 720
 tcttttccta atatacattt acaccaagac attatcaaaa aatgtgaaca gttttaggc 780
 cactcacag ttaatgagaa aagaagattg caattgatta tgccctgccag gttttatcca 840
 aaggttacca aatatttacc attggataag ggtattaaac cttattatcc agaacatcta 900
 gttaatcatt acttccaaac tagacactat ttacacactc tatggaaggc gggatatatta 960
 tataagagag aaacaacaca tagcgctca ttttgtgggt caccatattc ttgggaacaa 1020
 gatctacagc atggggcaga atctttccac cagcaatcct ctgggattct tccccacca 1080
 ccagttggat ccagccttca gagcaaacac cgcaaatcca gattgggact tcaatccaa 1140
 caaggacacc tggccagacg ccaacaaggc aggagctgga gcattcgggc tgggtttcac 1200
 cccaccgac ggaggccttt tgggtgtggg cctcaggct cagggcatac taaaaacttt 1260
 gccagcaaat ccgcctcctg cctccaccaa tcgccagtca ggaaggcagc ctaccccgct 1320
 gtctccacct ttgagaacaa ctcatcctca ggccatgcag tgggaattca caaccttcca 1380
 ccaaactctg caagatccca gactgagagg cctgtatttc cctgctggtg gctccagttc 1440
 aggaacagta aacctgttc tgactactgc ctctccctta tcgtcaatct tctcgaggat 1500
 tggggaccct gcgtgaaca tggagaacat cacatcagga ttctaggac cccttctcgt 1560
 gttacaggcg gggtttttct tgttgacaag aatcctcaca ataccgcaga gtctagactc 1620
 gtgggtggact tctctcaatt ttctaggggg aactaccgtg tgtcttgcc aaaattcgca 1680
 gtccccaacc tccaatcact caccaacctc ttgtctcca acttgcctcgt gttatcgctg 1740

gatgtgtctg cggcgtttta tcatcttcct cttcatcctg ctgctatgcc tcatcttctt	1800
gttggttctt ctggactatc aaggatgtt gcccgtttgt cctctaattc caggatcctc	1860
aacaaccagc acgggaccat gccggacctg catgactact gctcaaggaa cctctatgta	1920
tcctctctgt tgctgtacca aaccttcgga cggaaattgc acctgtattc ccatcccatc	1980
atcctgggct ttcggaaaat tcctatggga gtgggcctca gcccgtttct cctggctcag	2040
tttactagtg ccatttggtc agtgggtcgt agggctttcc cccactgttt ggctttcagt	2100
tatatggatg atgtggtatt gggggccaag tctgtacagc atcttgagtc cctttttacc	2160
gctgttacca attttctttt gtctttgggt atacatttaa accctaacaa aacaaagaga	2220
tggggttact ctctaaattt tatgggttat gtcattggat gttatgggtc cttgccacaa	2280
gaacacatca tacaaaaaat caaagaatgt tttagaaaac ttcctattaa caggcctatt	2340
gattggaaag tatgtcaacg aattgtgggt cttttgggtt ttgctgcccc ttttacacaa	2400
tggtggtatc ctgcgttgat gcctttgtat gcatgtattc aatctaagca ggctttcact	2460
ttctcgccaa cttacaaggc ctttctgtgt aaacaatacc tgaaccttta ccccgttgcc	2520
cggcaacggc cagggtctgtg ccaagtgtt gctgacgcaa cccccactgg ctggggcttg	2580
gtcatgggcc atcagcgcat gcgtggaacc ttttcggctc ctctgccgat ccatactgcg	2640
gaactcctag cgccttggtt tgctcgagc aggtctggag caaacattat cgggactgat	2700
aactctgttg tcctatcccg caaatataca tcgtttccat ggctgctagg ctgtgctgcc	2760
aactggatcc tgcgcgggac gtcctttgtt tacgtccgt cggcgctgaa tcctgcggac	2820
gaccttctc ggggtcgctt gggactctct cgtccccctc tccgtctgcc gttccgaccg	2880
accacggggc gcacctctct ttacgcggac tccccgtctg tgccttctca tctgccggac	2940
cgtgtgcact tcgcttcacc tctgcacgtc gcatggagac caccgtgaac gccacacaaa	3000
tattgcccac ggtcttacat aagaggactc ttggactctc agcaatgtca acgaccgacc	3060
ttgaggcata cttcaaagac tgtttgttta aagactggga ggagttgggg gaggagatta	3120
ggttaaaggt ctttgtacta ggaggctgta ggcataaatt ggtctgcgca ccagcaccat	3180
gcaacttttt cacctctgcc taatcatctc ttgttcatgt cctactgttc aagcctccaa	3240
gctgtgcctt ggggtggctt ggggcatgga catcgacct tataaagaat ttggagctac	3300
tgtggagtta ctctcgtttt tgccttctga cttctttcct tcagtacgag atcttctaga	3360
gggcctatt ctatagtgtc acctaaatgc tagaggatct ttgtgaagga accttacttc	3420
tgtggtgtga cataattgga caaactacct acagagattt aaagctctaa ggtaaata	3480
aaatttttaa gtgtataatg tgtaaacta ctgattctaa ttgtttgtgt attttagatt	3540
ccaacctatg gaactgatga atgggagcag tgggtgaatg cctttaatga ggaaaacctg	3600
ttttgctcag aagaaatgcc atctagtgat gatgaggcta ctgctgactc tcaacattct	3660

actcctccaa aaaagaagag aaaggtagaa gaccccaagg actttccttc agaattgcta	3720
agttttttga gtcattgctgt gtttagtaat agaactcttg cttgctttgc tatttacacc	3780
acaaagggaaa aagctgcact gctatacaag aaaattatgg aaaaatattt gatgtatagt	3840
gccttgacta gagatcataa tcagccatac cacatttgta gaggttttac ttgctttaaa	3900
aaacctccca cacctccccc tgaacctgaa acataaaatg aatgcaattg ttgttggtta	3960
cttgtttatt gcagcttata atgggttaca ataaagcaat agcatcacia atttcacaaa	4020
taaagcattt ttttactgc attctagttg tggtttgctc aaactcatca atgtatctta	4080
tcatgtctgg atcatccgc catgggtatca acgcatatt tctatttaca gtagggacct	4140
cttcgtttg taggtaccgc tgtattccta gggaaatagt agaggcacct tgaactgtct	4200
gcatcagcca tatagccccc gctgttcgac ttacaaacac aggcacagta ctgacaaacc	4260
catacacctc ctctgaaata cccatagttg ctagggtgt ctccgaactc attacaccct	4320
ccaaagtcag agctgtaatt tcgccatcaa gggcagcgag ggcttctcca gataaaatag	4380
cttctgccga gagtcccgta agggtagaca cttcagctaa tccctcgatg aggtctacta	4440
gaatagtcag tgcggctccc attttgaaaa ttcacttact tgatcagctt cagaagatgg	4500
cggagggcct ccaacacagt aattttcctc ccgactctta aaatagaaaa tgtcaagtca	4560
gttaagcagg aagtggacta actgacgcag ctggccgtgc gacatcctct ttttaattag	4620
tgctaggcaa cgccctccag agggcgtgtg gttttgcaag aggaagcaaa agcctctcca	4680
ccaggccta gaatgtttcc acccaatcat tactatgaca acagctgttt tttttagtat	4740
taagcagagg cgggggaccc ctgggcccgc ccgcttactc tggagaaaaa gaagagaggc	4800
attgtagagg cttccagagg caacttgtca aaacaggact gcttctattt ctgtcacact	4860
gtctggccct gtcacaaggt ccagcacctc cataccccct ttaataagca gtttgggaac	4920
gggtgcgggt cttactccgc ccatcccgc cctaactccg ccagttccg ccattctcc	4980
gccccatggc tgactaatth tttttattta tgcagaggcc gaggcgcct cggcctctga	5040
gctattccag aagtagtgag gaggtttttt tggaggccta ggcttttgca aaaagctaat	5100
tcggcgtaat ctgctgcttg caaacaacaaa aaccaccgct accagcgggt gtttgtttgc	5160
cggatcaaga gctaccaact ctttttccga aggttaactgg cttcagcaga gcgcagatac	5220
caaatactgt ctttctagt tagccgtagt taggccacca cttcaagaac tctgtagcac	5280
cgcctacata cctcgctctg ctaatcctgt taccagtggc tgctgccagt ggcgataagt	5340
cgtgtcttac cgggttggaac tcaagacgat agttaccgga taaggcgcag cggtcgggct	5400
gaacgggggg ttcgtgcaca cagcccagct tggagcgaac gacctacacc gaactgagat	5460
acctacagcg tgagcattga gaaagcgcca cgcttcccga agggagaaaag gcggacaggt	5520

taatcaatta cggggtcatt agttcatagc ccatatatgg agttccgcgt tacataactt	7500
acggtaaattg gcccgcctgg ctgaccgccc aacgaccccc gccattgac gtcaataatg	7560
acgtatgttc ccatagtaac gccaataggg actttccatt gacgtcaatg ggtggactat	7620
ttacggtaaa ctgccactt ggcagtacat caagtgtatc atatgccaa gacgccccct	7680
attgacgtca atgacggtaa atggcccgcc tggcattatg ccagtagacat gaccttatgg	7740
gactttccta cttggcagta catctacgta ttagtcatcg ctattacat ggtgatgcgg	7800
ttttggcagt acatcaatgg gcgtggatag cggtttgact cacggggatt tccaagtctc	7860
cacccattg acgtcaatgg gagtttgttt tggcaccaaa atcaacggga ctttcacaaa	7920
tgctgtaaca actccgcccc attgacgcaa atggcgcgga ggcgtgtacg gtgggaggtc	7980
tatataagca gagctctctg gctaact	8007

<210> 4
 <211> 8717
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> R711: pCMV-HBV/GFP Full Sequence

<400> 4	
aactttttca cctctgccta atcatctctt gttcatgtcc tactgttcaa gcctccaagc	60
tgtgccttgg gtggctttgg ggcattggaca tcgaccctta taaagaattt ggagctactg	120
tggagttact ctgcgtttttg ccttctgact tctttccttc agtacgagat cttctagata	180
cgcctcagc tctgtatcgg gaagccttag agtctcctga gcattgttca cctcaccata	240
ctgcactcag gcaagcaatt ctttgcctgg ggaactaat gactctagct acctgggtgg	300
gtgttaattt ggaagatcca gcgtctagag acctagtagt cagttatgtc aacactaata	360
tgggcctaaa gttcaggcaa ctcttctggt ttcacatttc ttgtctcact tttggaagag	420
aaacagttat agagtatttg gtgtctttcg gagtgtggat tcgcactcct ccagcttata	480
gaccacaaa tgcccctatc ctatcaacac ttccggagac tactgttggt agacgacgag	540
gcaggtcccc tagaagaaga actccctcgc ctgcgacgc aaggtctcaa tcgccgcgtc	600
gcagaagatc tcaatctcgg gaatctcaat gtagtatttc cttggactca taagggtggg	660
aactttactg ggctttattc ttctactgta cctgtcttta atcctcattg gaaaacacca	720
tcttttcta atatacatc acaccaagac attatcaaaa aatgtgaaca gtttgtaggc	780
ccactcacag ttaatgagaa aagaagattg caattgatta tgccctgccag gttttatcca	840
aaggttacca aatatttacc attggataag ggtattaaac cttattatcc agaacatcta	900
gttaatcatt acttccaaac tagacactat ttacacactc tatggaaggc gggtatatta	960

tataagagag aaacaacaca tagcgctca ttttgtgggt caccatattc ttgggaacaa	1020
gatctacagc atggggcaga atctttccac cagcaatcct ctgggattct ttcccgacca	1080
ccagttggat ccagccttca gagcaaacac cgcaaatcca gattgggact tcaatcccaa	1140
caaggacacc tggccagacg ccaacaaggt aggagctgga gcattcgggc tgggtttcac	1200
cccaccgcac ggaggccttt tgggggtggag ccctcaggct cagggcatac tacaaaacttt	1260
gccagcaaat ccgcctcctg cctccaccaa tcgccagtca ggaaggcagc ctaccccgt	1320
gtctccacct ttgagaaaca ctcatcctca ggagatgagt aaaggagaag aacttttcac	1380
tggagttgtc ccaattcttg ttgaattaga tggatgatgt aatgggcaca aattttctgt	1440
cagtggagag ggtgaagggt atgcaacata cggaaaactt acccttaaat ttatttgcac	1500
tactggaaaa ctacctgttc catggccaac acttgtcact actttctctt atgggtgtca	1560
atgcttttca agatacccag atcatatgaa acagcatgac tttttcaaga gtgccatgcc	1620
cgaagggttat gtacaggaaa gaactatatt tttcaagat gacgggaact acaagacacg	1680
tgctgaagtc aagtttgaag gtgataccct tgttaataga atcgagttaa aaggattga	1740
ttttaaagaa gatggaaaca ttcttggaca caaattggaa tacaactata actcacacaa	1800
tgtatacatc atggcagaca aacaaaagaa tggaatcaaa gttaacttca aaattagaca	1860
caacattgaa gatggaagcg ttcaactagc agacattat caacaaaata ctccaattgg	1920
cgatggccct gtccttttac cagacaacca ttacctgtcc acacaatctg ccctttcgaa	1980
agatcccaac gaaaagagag accacatggg ccttcttgag ttgtaacag ctgctgggat	2040
tacacatggc atggatgaac tatacaaata aggaattcca caaccttcca ccaaactctg	2100
caagatccca gagtgagagg cctgtatttc cctgctgggt gctccagttc aggaacagta	2160
aacctgttc tgactactgc ctctccctta tcgtcaatct tctcgaggat tggggaccct	2220
gcgctgaaca tggagaacat cacatcagga ttcttaggac cccttctcgt gttacaggcg	2280
gggtttttct tgttgacaag aatcctcaca ataccgcaga gtctagactc gtggtggact	2340
tctctcaatt ttctaggggg aactaccgtg tgtcttggcc aaaattcgca gtccccaacc	2400
tccaatcact caccaacctc ttgtcctcca acttgtcctg gttatcgctg gatgtgtctg	2460
cggcgtttta tcattctcct ctctacctg ctgctatgcc tcattctctt gttggttctt	2520
ctggactatc aaggatgtgt gcccgtttgt cctctaattc caggatcctc aacaaccagc	2580
acgggaccat gccggacctg catgactact gctcaaggaa cctctatgta tcctcctgt	2640
tgctgtacca aaccttcgga cggaaattgc acctgtatcc ccatcccatc atcctgggct	2700
ttcggaaaat tcctatggga gtgggcctca gcccgtttct cctggctcag ttactagtg	2760
ccatttgctc agtggttcgt agggctttcc ccactgttt ggctttcagt tatatggatg	2820

atgtggtatt gggggccaag tctgtacagc atcttgagtc cctttttacc gctggtacca	2880
atcttctttt gtctttgggt atacatttaa accctaaca aacaaagaga tgggggtact	2940
ctctaaattt tatgggttat gtcattggat gttatgggtc cttgccacaa gaacacatca	3000
tacaaaaaat caaagaatgt tttagaaaac ttcctattaa caggcctatt gattggaaag	3060
tatgtcaacg aattgtgggt cttttgggtt ttgctgcccc ttttacacaa tgtgggtatc	3120
ctgcgttgat gcctttgtat gcatgtattc aatctaagca ggctttcact ttctcgccaa	3180
cttacaaggc ctttctgtgt aaacaatacc tgaaccttta ccccgttgcc cggcaacggc	3240
caggctctgtg ccaagtgttt gctgacgcaa cccccactgg ctggggcttg gtcattgggc	3300
atcagcgcac gcgtggaacc ttttcggtc ctctgcgcac ccatactgcg gaactcctag	3360
ccgcttggtt tgctcgagc aggtctggag caaacattat cgggactgat aactctgttg	3420
tcctatcccg caaatatata tcgtttccat ggctgctagg ctgtgctgcc aactggatcc	3480
tgcgcgggac gtcctttgtt tacgtcccg cggcgctgaa tcctgcggac gacccttctc	3540
ggggtcgctt gggactctct cgtccccttc tccgtctgcc gttccgaccg accacggggc	3600
gcacctctct ttacgcggac tccccgtctg tgctttctca tctgccggac cgtgtgcaact	3660
tcgcttcacc tctgcacgtc gcatggagac caccgtgaac gccaccacaa tattgcccac	3720
ggtcttacat aagaggactc ttggactctc agcaatgtca acgaccgacc ttgaggcata	3780
cttcaaagac tgtttgttta aagactggga ggagttgggg gaggagatta ggttaaagg	3840
ctttgtacta ggaggctgta ggcataaatt ggtctgcgca ccagcaccat gcaacttttt	3900
cacctctgcc taatcatctc ttgttcatgt cctactgttc aagcctccaa gctgtgcctt	3960
gggtggcttt ggggcatgga catcgacct tataaagaat ttggagctac tgtggagtta	4020
ctctcgtttt tgctttctga cttctttcct tcagtagcag atcttctaga gggccctatt	4080
ctatagtgtc acctaaatgc tagaggatct ttgtgaagga acctacttc tgtggtgtga	4140
cataattgga caaactacct acagagattt aaagctctaa ggtaaatata aaatttttaa	4200
gtgtataatg tgttaaacta ctgattctaa ttgtttgtgt attttagatt ccaacctatg	4260
gaactgatga atgggagcag tgggtggaatg cctttaatga ggaaaacctg ttttgcctag	4320
aagaaatgcc atctagtgt gatgaggcta ctgctgactc tcaacattct actcctccaa	4380
aaaagaagag aaaggtagaa gacccaagg actttccttc agaattgcta agttttttga	4440
gtcatgctgt gtttagtaat agaactcttg cttgctttgc tatttacacc acaaaggaaa	4500
aagctgcact gctatacaag aaaattatgg aaaaatatgt gatgtatagt gccttgacta	4560
gagatcataa tcagccatac cacatttgta gaggttttac ttgctttaaa aaacctccca	4620
cacctcccc tgaacctgaa acataaaatg aatgcaattg ttgttggtta cttgtttatt	4680
gcagcttata atggttacaa ataaagcaat agcatcacia atttcacaaa taaagcattt	4740

aagggcgaaa aaccgtctat cagggcgatg gccgcccact acgtgaacca tcacccaaat	6660
caagttttttt ggggtcgagg tgccgtaaag cactaaatcg gaaccctaaa gggagccccc	6720
gatttagagc ttgacgggga aagccggcga acgtggcgag aaaggaaggg aagaaagcga	6780
aaggagcggg cgctagggcg ctggcaagtg tagcggtcac gctgcgcgta accaccacac	6840
ccgccgcgct taatgcgccg ctacagggcg cgtactatgg ttgctttgac gagaccgtat	6900
aacgtgcttt cctcgttga atcagagcgg gagctaaaca ggaggccgat taaagggatt	6960
ttagacagga acggtacgcc agctggatta ccaaagggcc tcgtgatacg cctattttta	7020
taggttaatg tcatgataat aatggtttct tagacgtcag gtggcacttt tcggggaaat	7080
gtgcgcggaa cccctatttg tttatttttc taaatacatt caaatatgta tccgctcatg	7140
agacaataac cctgataaat gcttcaataa tattgaaaaa ggaagagtat gagtattcaa	7200
catttccgtg togcccttat tccctttttt gcggcatttt gccttcctgt ttttgctcac	7260
ccagaaacgc tggtgaaagt aaaagatgct gaagatcagt tgggtgcacg agtgggttac	7320
atcgaaactgg atctcaacag cggtaagatc cttgagagtt ttcgccccga agaacgtttt	7380
ccaatgatga gcacttttaa agttctgcta tgtggcgagg tattatcccg tgttgacgcc	7440
gggcaagagc aactcggtcg ccgcatacac tattctcaga atgacttggt tgagtactca	7500
ccagtcacag aaaagcatct tacggatggc atgacagtaa gagaattatg cagtgtgcc	7560
ataaccatga gtgataaac tgccggccaac ttacttctga caacgatcgg aggaccgaag	7620
gagctaaccg cttttttgca caacatgggg gatcatgtaa ctgccttga tcgttgggaa	7680
ccggagctga atgaagccat accaaacgac gagcgtgaca ccacgatgcc tgcagcaatg	7740
gcaacaacgt tgcgcaaact attaaactggc gaactactta ctctagcttc ccggcaacaa	7800
ttaatagact ggatggaggc ggataaagtt gcaggaccac ttctgcgctc ggcccttcog	7860
gctggctggt ttattgctga taaatctgga gccggtgagc gtgggtctcg cggtatcatt	7920
gcagcactgg ggccagatgg taagccctcc cgtatcgtag ttatctacac gacggggagt	7980
caggcaacta tggatgaacg aaatagacag atcgtgaga taggtgcctc actgattaag	8040
cattggtaac tgtcagacca agtttactca tatatacttt agattgattt aaaacttcat	8100
ttttaatttc tctagcgcgt tgacattgat tattgactag ttattaatag taatcaatta	8160
cggggtcatt agttcatagc ccatatatgg agttccgcgt tacataactt acggtaaatg	8220
gcccgcctgg ctgaccgccc aacgaccccc gccattgac gtcaataatg acgtatgttc	8280
ccatagtaac gccaataggg actttccatt gacgtcaatg ggtggactat ttacggtaaa	8340
ctgccactt ggacgtacat caagtgtatc atatgccaaag tacgccccct attgacgtca	8400
atgacggtaa atggccccgc tggcattatg ccagtagcat gaccttatgg gactttccta	8460
cttggcagta catctacgta ttagtcatcg ctattacat ggtgatgcgg ttttggcagt	8520

gtctccacct ttgagaaaca ctcatcctca ggagatgagt aaaggagaag aacttttcac	1380
tggagttgtc ccaattcttg ttgaattaga tggatgatgtt aatgggcaca aattttctgt	1440
cagtggagag ggtgaagggtg atgcaacata cggaaaactt acccttaaatt ttatttgac	1500
tactggaaaa ctacctgttc catggccaac acttgtcact actttctctt atggtgttca	1560
atgcttttca agatacccag atcatatgaa acagcatgac tttttcaaga gtgccatgcc	1620
cgaagggttat gtacaggaaa gaactatatt tttcaaagat gacgggaact acaagacacg	1680
tgctgaagtc aagtttgaag gtgataccct tgttaataga atcgagttaa aaggtattga	1740
ttttaaagaa gatggaaaca ttcttggaaca caaattggaa tacaactata actcacacaa	1800
tgtatacatc atggcagaca aacaaaagaa tggaatcaaa gttaacttca aaattagaca	1860
caacattgaa gatggaagcg ttcaactagc agaccattat caacaaaata ctccaattgg	1920
cgatggccct gtccttttac cagacaacca ttacctgtcc acacaatctg ccttttcgaa	1980
agatcccaac gaaaagagag accacatggt ccttcttgag tttgtaacag ctgctgggat	2040
tacacatggc atggatgaac tatacaaata aggaattctt cagttatatg gatgatgtgg	2100
tattgggggc caagtctgta cagcatcttg agtccctttt taccgctgtt accaattttc	2160
ttttgtcttt gggatatacat ttaaacccta acaaaacaaa gagatgggggt tactctctaa	2220
attttatggg ttatgtcatt ggatgttatg ggtccttgcc acaagaacac atcatacaaa	2280
aaatcaaaga atgtttttaga aaacttccta ttaacaggcc tattgattgg aaagtatgtc	2340
aacgaattgt gggctcttttg ggttttgctg ccccttttac acaatgtggt tatcctgcgt	2400
tgatgccttt gtatgcatgt attcaatcta agcaggcttt cactttctcg ccaacttaca	2460
aggcctttct gtgtaaacaa tacctgaacc tttaccccggt tgcccggaac cggccaggtc	2520
tgtgccaaagt gtttgcgtgac gcaaccccca ctggctgggg cttgggtcatg ggccatcagc	2580
gcatgcgtgg aaccttttcg gctcctctgc cgatccatac tgcggaactc ctagccgctt	2640
gttttgctcg cagcaggctt ggagcaaaca ttatcgggac tgataactct gttgtcctat	2700
cccgcaaata tacatcgttt ccattggctgc taggctgtgc tgccaactgg atcctgcgag	2760
ggacgtcctt tgtttacgtc ccgtcggcgc tgaatcctgc ggacgaccct tctcggggtc	2820
gcttgggact ctctcgtccc ctctcgcgtc tgccgttccg accgaccacg gggcgacact	2880
ctctttacgc ggactccccg tctgtgcctt ctcatctgcc ggaccgtgtg cacttcgctt	2940
cacctctgca cgtcgcatgg agaccaccgt gaacgcccac caaatattgc ccaaggctctt	3000
acataagagg actcttggac tctcagcaat gtcaacgacc gaccttgagg catacttcaa	3060
agactgtttg tttaaagact gggaggagtt gggggaggag attagggttaa aggtctttgt	3120
actaggaggc tgtaggcata aattgggtctg cgcaccagca ccatgcaact ttttcacctc	3180

tgccaatca tctcttggtc atgtcctact gttcaagcct ccaagctgtg ccttgggtgg	3240
ctttggggga tggacatcga cccttataaa gaatttggag ctactgtgga gttactctcg	3300
tttttgcctt ctgacttctt tccttcagta cgagatcttc tagagggccc tattctatag	3360
tgtcacctaa atgctagagg atctttgtga aggaacctta cttctgtggt gtgacataat	3420
tggacaaact acctacagag atttaaagct ctaaggtaaa tataaaattt ttaagtgtat	3480
aatgtgttaa actactgatt ctaattgttt gtgtatttta gattccaacc tatggaactg	3540
atgaatggga gcagtgggtg aatgccttta atgaggaaaa cctgttttgc tcagaagaaa	3600
tgccatctag tgatgatgag gctactgctg actctcaaca ttctactcct ccaaaaaaga	3660
agagaaaggt agaagacccc aaggactttc cttcagaatt gctaagtttt ttgagtcatg	3720
ctgtgttttag taatagaact cttgcttgct ttgctattta caccacaaag gaaaaagctg	3780
cactgctata caagaaaatt atggaaaaat atttgatgta tagtgccctg actagagatc	3840
ataatcagcc ataccacatt ttagagaggt ttacttgctt taaaaaacct cccacacctc	3900
cccctgaacc tgaaacataa aatgaatgca attgttggtg ttaacttggt tattgcagct	3960
tataatgggt acaataaag caatagcatc acaaatttca caaataaagc atttttttca	4020
ctgcattcta gttgtggttt gtccaaactc atcaatgtat cttatcatgt ctggatcatc	4080
ccgccatggt atcaacgcca tatttctatt tacagtaggg acctcttcgt tgtgtaggta	4140
ccgctgtatt cctagggaaa tagtagaggc accttgaact gtctgcatca gccatatagc	4200
ccccgctgtt cgacttacaa acacaggcac agtactgaca aaccataca cctcctctga	4260
aatacccata gttgctaggg ctgtctccga actcattaca ccctccaaag tcagagctgt	4320
aatttcgcca tcaagggcag cgagggttc tccagataaa atagcttctg ccgagagtcc	4380
cgtaagggtg gacacttcag ctaatccctc gatgaggtct actagaatag tcagtgcggc	4440
tcccattttg aaaattcact tacttgatca gcttcagaag atggcggagg gcctccaaca	4500
cagtaatttt cctcccgaact cttaaaatag aaaatgtcaa gtcagttaag cagggaagtgg	4560
actaactgac gcagctggcc gtgcgacatc ctcttttaat tagttgctag gcaacgccct	4620
ccagagggcg tgtggttttg caagaggaag caaaagcctc tccaccagg cctagaatgt	4680
ttccacccaa tcattactat gacaacagct gtttttttta gtattaagca gaggccgggg	4740
acccttgggc cggcccgtt actctggaga aaaagaagag aggcattgta gaggcttcca	4800
gaggcaactt gtcaaaacag gactgcttct atttctgtca cactgtctgg ccctgtcaca	4860
aggtccagca cctccatacc ccctttaata agcagtttg gaacgggtgc gggctctact	4920
ccgcccaccc cgcccctaac tccgcccagt tccgcccatt ctccgcccga tggctgacta	4980
atttttttta ttatgcaga ggccgaggcc gcctcgccct ctgagctatt ccagaagtag	5040
tgaggaggct ttttggagg cctaggcttt tgcaaaaagc taattcggcg taatctgctg	5100

cttgcaaaca aaaaaaccac cgctaccagc ggtggtttgt ttgccggatc aagagctacc	5160
aactcttttt ccgaaggtaa ctggcttcag cagagcgcag ataccaaata ctgtccttct	5220
agtgtagccg tagttaggcc accacttcaa gaactctgta gcaccgccta catacctcgc	5280
tctgctaata ctgttaccag tggctgctgc cagtggcgat aagtcgtgtc ttaccgggtt	5340
ggactcaaga cgatagttag cgataaggc gcagcggctc ggctgaacgg ggggttcgtg	5400
cacacagccc agcttggagc gaacgaccta caccgaactg agatacctac agcgtgagca	5460
ttgagaaagc gccacgcttc ccgaagggag aaaggcggac aggtatccgg taagcggcag	5520
ggtcgggaaca ggagagcgca cgagggagct tccaggggga aacgcctggt atctttatag	5580
tcctgtcggg tttcgccacc tctgacttga gcgtcgattt ttgtgatgct cgtcaggggg	5640
gcggagccta tggaaaaacg ccagcaacgc aagctagctt ctagctagaa attgtaaacg	5700
ttaatatattt gttaaaattc gcgttaaatt tttgttaaata cagctcattt tttaaccaat	5760
aggccgaaat cggcaaaatc cttataaat caaagaata gcccgagata gggttgagtg	5820
ttgttccagt ttggaacaag agtcactat taaagaacgt ggactccaac gtcaaagggc	5880
gaaaaaccgt ctatcagggc gatggccgcc cactacgtga accatcacc aaatcaagtt	5940
ttttggggtc gaggtgccgt aaagcactaa atcggaacc taaaggagc ccccgattta	6000
gagcttgacg gggaaagccg gcgaacgtgg cgagaaagga agggaagaaa gcgaaaggag	6060
cgggcgctag ggcgctggca agtgtagcgg tcacgctgcg cgtaaccacc acaccgccg	6120
cgcttaatgc gccgctacag ggcgctact atggttgctt tgacgagacc gtataacgtg	6180
ctttcctcgt tggaaatcaga gcgggagcta aacaggaggc cgattaaagg gatttttagac	6240
aggaacggta cgccagctgg attaccaaag ggctcgtga tacgcctatt tttataggtt	6300
aatgtcatga taataatggt ttcttagacg tcaggtggca cttttcgggg aaatgtgcgc	6360
ggaaccctta tttgtttatt tttctaaata cattcaaata tgtatccgct catgagacaa	6420
taaccctgat aaatgcttca ataattattga aaaaggaaga gtatgagtat tcaacatttc	6480
cgtgtcgccc ttattccctt ttttgcggca ttttgccttc ctgtttttgc tcaccagaa	6540
acgctggtga aagtaaaaga tgctgaagat cagttgggtg cacgagtggg ttacatcgaa	6600
ctggatctca acagcggtaa gatccttgag agttttcgcc ccgaagaacg ttttccaatg	6660
atgagcactt ttaaagttct gctatgtggc gcggtattat cccgtgttga cgccgggcaa	6720
gagcaactcg gtcgcgcgat acactattct cagaatgact tggttgagta ctcaccagtc	6780
acagaaaagc atcttacgga tggcatgaca gtaagagaat tatgcagtgc tgccataacc	6840
atgagtgata acactgcggc caacttactt ctgacaacga tcggaggacc gaaggagcta	6900
accgcttttt tgcacaacat gggggatcat gtaactcgcc ttgatcgttg ggaaccggag	6960

ctgaatgaag ccataccaaa cgacgagcgt gacaccacga tgccctgcagc aatggcaaca	7020
acgttgcgca aactattaac tggcgaacta cttactctag cttcccggca acaattaata	7080
gactggatgg aggcggataa agttgcagga ccacttctgc gctcggccct tccggctggc	7140
tggtttattg ctgataaatc tggagccggt gagcgtgggt ctcgcggtat cattgcagca	7200
ctggggccag atggtaagcc ctcccgatc gtagttatct acacgacggg gagtcaggca	7260
actatggatg aacgaaatag acagatcgct gagatagggt cctcactgat taagcattgg	7320
taactgtcag accaagttta ctcatatata ctttagattg atttaaaact tcatttttaa	7380
tttctctagc gcgttgacat tgattattga ctagttatta atagtaatca attacgggggt	7440
cattagttca tagcccatat atggagtcc gcgttacata acttacggta aatggcccg	7500
ctggctgacc gcccaacgac ccccgcccat tgacgtcaat aatgacgtat gttcccatag	7560
taacgccaat agggactttc cattgacgtc aatgggtgga ctatttacgg taaactgccc	7620
acttggcagt acatcaagtg tatcatatgc caagtacgcc cctattgac gtcaatgacg	7680
gtaaatggcc cgctggcat tatgcccagt acatgacctt atgggacttt cctacttggc	7740
agtacatcta cgtattagtc atcgctatta ccatggtgat gcggttttgg cagtacatca	7800
atgggcgtgg atagcggttt gactcacggg gatttccaag tctccacccc attgacgtca	7860
atgggagttt gttttggcac caaatcaac gggactttcc aaaatgtcgt aacaactccg	7920
ccccattgac gcaaatgggc ggtaggcgtg tacggtggga ggtctatata agcagagctc	7980
tctggctaac t	7991